

Linkage between Financial Development and Income Inequality in India

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Abstract

A sound financial system is a prerequisite for the inclusive and stable development of an economy, especially it plays a key role in dealing with the menace of inequality in income distribution. Economic policies including monetary and fiscal policy framed by the policymakers influence the accessibility to the financial resources by the poor. This study intends to examine the relationship between financial development and income inequality in India over the period 1973 to 2015. To analyze this relationship, the financial development index was constructed using the PCA approach. The study also checks the presence of the Greenwood–Jovanovich (G.J) hypothesis in the Indian economy. In this study, the ARDL Bound testing procedure is followed to assess the impact of financial development on income inequality. Besides financial development, the impact of economic development and government expenditure is also observed. Results confirm the existence of an inverted U-shaped linkage between financial development and income inequality in India, whereas economic development deteriorates the gap between the income of poor and rich. Furthermore, a U-shaped relationship between government expenditure and income inequality is revealed in this study. The findings of this study may provide new insight to the policymakers for framing suitable economic policies to encourage sustainable development in India.

1 Introduction

Finance holds a key role in the growth of the economies across the world ever since it has become the medium of exchange. According to Levine (1997), transaction cost and information cost provide incentives for the materialization of financial institutions and markets. Financial systems facilitate trading, diversification of risk, resource allocation, mobilization of saving, and monitoring the corporate managers apart from capital accumulation and technological innovations (Levine 1997). Reforms in the financial system widen the developmental role of finance which improves the market inefficiencies and lowers the transaction cost (Sehrawat and Giri 2017). A robust financial infrastructure leads to the growth of businesses and thereby generation of more employment and income (Sehrawat and Giri 2016). Recently, many researchers empirically investigated that financial development positively explains the economic growth of a country (Guru and Yadav 2019, Masoud and Hardaker 2012, Mohieldin et al. 2019, Puatwoe and Piabuo 2017 and Sehrawat and Giri 2016).

It is derived from the extant literature that a developed financial system contributes toward the robust development of an economy. However, it doesn't explain which segment of the society is benefited by the financial development enabled growth. It may empower poor or favours entrepreneurs (Jauch and Watzka 2016). The economic growth rate is slow in the initial stage of development but when the income level starts rising, the financial system turns widespread, the economy grows speedily, and income inequality between poor and rich rises. At the stage of maturity, the financial system is completely developed, income inequality is stable, and the economy growth rate is more than its initial stage (Greenwood and Jovanovic 1990). In the rapid phase of economic development, developing countries are driven by the manufacturing sector of the economy that creates employment opportunities for highly educated and skilled people. People living in rural areas are still based on agriculture activities and spend less on education and health thereby having less access to such a skilled job. Therefore, poor people have less capacity to save and further invest. Sometimes financial services are beyond the reach of people living in the villages when the financial system is underdeveloped or unmanaged. The financial system in emerging countries developed in terms of size and liquidity during the last two decades but such development didn't benefit the poor (Seven and Coskun 2016). Indeed, financial institutions didn't focus on optimum allocation of funds encompassing the holistic development of the society rather they serve their interest for example a major proportion of the bank credit is provided to the private sector. It's a matter of concern for all the emerging countries.

Nevertheless, when financial markets reach their maturity level and become efficient led by appropriate financial policies then it enables the deprived to access financial resources at economical cost which further upsurges investments. Subsequently, employment opportunities are made and the income level of the poor starts rising which results in the creation of human capital. Inventions come with human capital that fetches technological progress which is key to the robust economic growth (Tiwari et al. 2013). Economic growth led by an inclusive financial system is meaningful for all segments of society.

In India, the progress of the financial sector, in particular, banking sector started with the nationalization of banks in the year 1969 and 1980 when public sector banks (PSUs) were asked to expand their branches in rural areas and provide credit for main sectors such as agriculture, small scale industries, export-oriented industries, etc., Afterwards due to high involvement of government and other constraints PSUs had to face insolvency, low profitability and non-performing assets (NPAs) (Shirai 2004), which forced the government to introduce financial sector reforms in the year 1991 to make the Indian financial system more competitive and efficient by removing its deficiencies. Subsequently, a vast division system of commercial banks, regional rural banks (RRBs), co-operative banks, small finance banks and microfinance institutions with the entering of private sector bank and overseas banks contributed towards the delivering of better financial services and credit requirements of industrialist, farmers, and traders and household. Reduced SLR and CRR enabled the bank to have more financial resources for mobilization (Yoo 2005). Similarly, Capital market reforms including screen-based trading, dematerialization, investor protection, and entry of foreign institutional investors (Shirai 2004) enabled the corporates to meet their financial requirements at an affordable cost. Along with equity market growth, the development of the corporate bond market and derivative transactions made the Indian financial market more advanced. Owing to its credible financial policies, India could withstand the widespread global financial recession in 2008.

Since 2010, RBI has come with firm measures such as simplified KYC norms, the opening of bank branches in unbanked rural areas, expansion of ATMs, creation of financial literacy centers (FLCs), Issue of Kissan credit card and general credit cards in the direction of comprehensive financial inclusion. The government of India has also initiated inclusive growth policies, particularly after the recommendations of the Rangarajan Committee in 2008, to reach to the masses. Government has launched, Swabhimaan scheme in 2011, Pradhan Mantri Jan Dhan Yojana (PMJDY) in 2014, Pradhan Mantri Mudra Yojana in 2015, etc. in this direction. These schemes bring the poor and underprivileged to the mainstream of the financial system and provide several benefits to them. Moreover, appropriate financial policies helped the government to redistribute income from the well off to the deprived. Eventually, the gap between the income of poor and rich start declining.

As depicts in the Fig. 1, income inequality in India rises 5.17% during 1992-99, when financial reforms were initiated. It further rises 8.37% during 2000-07, there after it increases merely at 2.77% during 2008-15, which is the outcome of government and RBI efforts towards inclusion of all sections of the society, particularly poor and underprivileged, in the formal financial system.

<INSERT FIGURE 1 HERE>

Progress in Indian financial system and trend in income distribution shows that the initial benefits of liberal policies were mostly reaped by capitalists and industrialists and on further implementation of financial inclusion measures by the government the benefits started reaching to the general public and the gap of income distribution improves (Fig. 1). Hence, it is useful to investigate the association between development of financial system and income inequality in India which may prove beneficial for policymakers and regulators to frame appropriate policies. This study contributes to the existing literature broadly in four ways: firstly, the study analyses the reversed U-shaped nexus between development of a financial system and inequality in income distribution in India following Greenwood-Jovanovic (GJ) hypothesis (1990). Secondly, it uses an aggregate measure of financial development based on a broad set of financial development indicators and it uses principal component analysis (PCA) to develop the index of the financial development. Thirdly, the current study provides a comprehensive review of the literature on financial development, economic growth, and income inequality nexus. Lastly, researchers find very few studies on this relationship in India specifically after the introduction of different schemes in India towards the complete financial inclusion.

This study is organised as follows : In Sect. 2, literature review is explained. section 3 deals with data and description of variables. section 4 describes the econometric methodology. Findings and discussions are stated in Sect. 5. Lastly, the conclusion and policy recommendations are given in Sect. 6.

2 Review Of Literature

After the seminal work on the linkage of financial development with economic growth, and of economic growth with income inequality, During the last two-decade association between channels of financial growth and income inequality attracted the attention of scholars all over the world particularly after the global financial crisis and volatile economic environment.

2.1 Financial Development and Economic Growth

Extensive literature support the argument that development of a financial system always brings economic prosperity. Pioneering work of Schumpeter (1911) shows that the progress of the financial system is imperative for the development of a country. Subsequently, empirical findings of Goldsmith (1969), McKinnon (1973) and Shaw (1973) also reported positive and significant link between financial growth and economic growth. Guru and Yadav (2019) using growth indicators of the stock market and banking sector for a panel of most developing economies including Brazil, Russia, India, China, and South from 1993 to 2014, found that the impact of the developed financial system on economic growth is positive and statistically significant. Using data of Egypt on financial progress indicators and economic development from 1980 to 2016, Mohieldin et al. (2019) employed econometric modeling of bivariate regression to investigate the association between financial progress and economic growth in Egypt. They revealed that both financial development indicator that is money supply and Index of Financial Markets Access have a strong association with real income growth whereas there is no significant association between efficiency of and access to banking services and real income growth. Bist (2018) applies Dynamic OLS and Fully Modified OLS on cross-sectional time-series data of 16 countries from 1995 to 2014 and finds that financial progress is necessary for the development of an economy. Similarly, Puatwoe and Piabuo (2017) applies bound test on data spanning from 1980 to 2014 and finds that developed financial system positively influences economic growth in Cameroon. Although the impact of development in the stock market on the growth of an economy is stronger than the impact of growth in the banking sector as stock market enhances liquidity and provides opportunities for dealing with risk whereas banks mainly focuses on long term association with the businesses (Masoud and Hardaker 2012). It is necessary to understand the evolution and working of financial system to comprehend the long term economic growth (Levine 1997).

2.2 Financial Development and Income Inequality

Most of the empirical work, covered in this study, depict a positive link between the developed financial system and inequality in income distribution but concurrently, many studies support reversed U-shaped link between them once the market reaches to its maturity level where all sections of the society are part of the formal financial system. Jauch and Watzka (2016) using a comprehensive dataset of 138 developed and developing countries from 1960 to 2008 and different estimation techniques such as Pooled OLS, fixed effects estimation, and GMM, notice a positive link of financial development with income inequality within countries and also add that any development in financial market cause rise in gross as well as net income inequality. Sehwat and Giri (2015) noted a long-run linkage between development of a financial system and income inequality in India using ARDL and ECM techniques on the data from 1982 to 2012 and report that developed financial system expands the gap between deprived and wealthy, and economic development further worsen the income equality in India. Their study does not support the Greenwood and Jovanovic (GJ) hypothesis of an inverted U-shaped relationship. Seven and Coskun (2016) develop three different measures of financial development namely bank-aggregate, market-aggregate, and finance-aggregate to evaluate the influence of developed financial system in poverty and inequality reduction. The study applies a dynamic system GMM technique on the data of 45 emerging countries from 1987 to 2011. It concludes that the effect of development in bank and stock market on the Gini coefficient in emerging countries is positive and statistically significant. Also, their study doesn't support reversed U-shaped association between the Gini coefficient and financial development. Shahbaz et al. (2015) explore the linkage of income inequality with financial development as well as with economic growth, globalization, and inflation using ARDL bound and ECM approach. They test the GJ hypothesis between inequality in income distribution and developed financial system and validates its empirical presence in Iran. Also, confirms U shaped association between globalization and inequality in income distribution. Bittencourt et al. (2019) apply fixed effect panel regression on cross-state panel data of 50 US state from 1976 to 2011. they split the states into two parts above and beneath normal inequality states. It is noted that financial development affects income distribution positively. A linear relationship exists in the US states. But for inequality states expressed as below-average, a nonlinear connection is seen which supports the reversed U-shaped link between financial progress and inequality. Access to financial services is key to

alleviate income inequality. Empirically, it is observed that the number of ATMs have a significant negative impact on income distribution (Kapingura 2017). The outcome of Tiwari et al. (2013) study shows a U-shaped relationship between financial growth and income of the rural persons in India over the period 1965–2008. In the long run, development in the financial system worsens the rural-urban income inequality. Kaidi and Mensi (2019) consider two different samples during 1980–2012, one is involving 31 autocratic countries and the other is made up of 93 democratic countries. Using different estimation techniques like generalized least squares (GLS), fixed effect model (FE) and system generalized moments method (GMM), they confirm that financial progress and political institutions in democratic countries plays a significant role in reducing income gap across poor and rich but in autocratic countries it plays an opposite role. Interaction between financial institutions and political institutions doesn't reduce income inequality in democratic countries whereas such interactions reduce income inequality in autocratic countries. They mention that it happens because autocratic countries take immediate financial decisions to boost investment opportunities while it takes a long time in democracy due to long and weighty procedures. Empirical evidence of Omar and Inaba (2020) study presents that strong financial inclusion decreases poverty and income inequality significantly in developing countries. they also argue that financial inclusion itself cannot influence the real economy substantially rather its effectiveness depends on the prevailing conditions of the economy and scenarios. Younsi and Bechtini (2020) examine the relationship among inequality in income distribution, economic growth and financial development in BRICS nations using data from 1990 to 2015. Findings of their study support the presence of Kuznets' inverted U-shaped relationship in both the cases. Destek et al. (2020) observe the link of overall financial progress and diverse measurements of financial progress with inequality in Turkey over the time 1990 to 2015. Using ARDL bound testing technique, they confirm the presence of reversed U-shaped linkage for overall financial progress and development in banking sector.

2.3 Economic growth and Income Inequality

Extant literature on this association shows mixed outcomes. Many researchers elucidate that the nature of the relationship between them depends on the state conditions as well as other factors also. Economic policies in Malaysia from 1970 to 1990 create a base for human development through export-oriented industrialization which further reduces income inequality but after 1990 to 1995 reverse trend is seen due to uneven distribution of speedy economic growth benefits (Shari 2000). Kavya and Shijin (2020) explore that in high-income countries, there is a presence of the Kuznets curve and financial curve hypothesis but in middle- and low-income countries there is a U-shaped relationship. Overall, they validate that economic growth along with financial development wouldn't lessen income inequality. Shin (2012) states that income inequality can be reduced in the steady phase of economic growth by redistributing the income from the rich to the poor through high taxes. But the same is not possible in the initial stage of economic development. Rubin and Segal (2015) conclude that the income of wealthy people is more reactive to development than the labour income of the poor. Furthermore, empirical evidence supports a positive relationship between income inequality and economic growth. Breunig and Majeed (2020) link the relationship between economic growth and income inequality with the poverty level. They observe that as the poverty level is increasing, the negative impact of inequality on economic growth is rising. Koh et al. (2020) empirically find that domestic credit to the private sector and economic growth increases inequality in china despite various policy measures taken by China. Berisha et al. (2019) report a positive impact of real economic growth, inflation, real interest rate on income inequality in BRIC countries and further state that this impact is stronger after 2008.

3. Data Description And Methodology

3.1 Model specification and Data

The empirical examination of the long-term link of income inequality with financial development is based on annual data of the variables spread from 1973 to 2015. The study used the natural log value of all the variables for analysis. Along with financial development, the present study included two other explanatory variables GDP per capita (constant 2010 US\$) as a representation for economic development (following Kavya and Shijin 2020 and Tiwari et al. 2013) and government expenditure (% of GDP) in line with the previous studies Jauch and Watzka (2016), Kapingura (2017) and Kavya and Shijin (2020). The Indian economy has been growing very fast since economic reforms which affect the inequality in income distribution. Likewise, Government expenditure, rise to double, is also one of the important variables that affect income inequality. Data on GDP per capita (constant 2010 US\$) and government expenditure (% of GDP) was taken from world development indicators, world bank. Gini coefficient, represents income inequality, data was collected from the database of Standardized World Income Inequality (SWIID 6.1) (Solt 2016).

Many studies have used different indicators as a proxy for the development of the financial structure. The selection of such proxy variables is difficult. Also, using correlated variables to represents financial development is inappropriate. Therefore, Using principal component analysis (PCA) technique, we constructed the composite financial index as a representation for financial development similar to the earlier studies Destek et al. (2020), Seven and Coskun (2016) and Younsi and Bechtini (2020). PCA is a statistical technique that converts the number of related variables into a fewer number of uncorrelated variables. The composite index is based on three indicators of financial development namely domestic credit to private sector (% of GDP) (DCPS), domestic credit provided by financial sector (% of GDP) (DCF), and broad money (BM). The construction of the composite financial index can be expressed as a functional relationship (Katircioğlu and Taşpınar 2017) given below.

$$\ln FD = f(\ln DCPS, \ln DCF, \ln BM) \quad (1)$$

DCPS advances on other indicators of financial development used in the existing literature and it is more than a simple measure of financial sector magnitude (Levine et al. 2000). DCF is also an important indicator as it represents credit growth in the country. Data on these indicators were taken from the global financial development database, world bank.

The basic model to investigate the long-run association between financial development and inequality in income distribution is specified as follows:

$$\ln IE_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln FD_t + \beta_3 \ln G_t + \varepsilon_t \quad (2)$$

Where t is the time period. Besides, $\ln Y_t$, $\ln FD_t$ and $\ln G_t$ represent economic development, financial development and government expenditure respectively. The error term is measured by ε_t . To examine the GJ hypothesis, that is the reversed U-shaped association, the squared term of financial development, and government expenditure are also added in the model (3) mentioned below. The main model used in the study is as follows:

$$\ln IE_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln FD_t + \beta_3 \ln FD_t^2 + \beta_4 \ln G_t + \beta_5 \ln G_t^2 + \varepsilon_t \quad (3)$$

Model (2) specified above confirms theory of increasing inequality if estimated parameters suggest $\beta_2 > 0$ and $\beta_3 = 0$; if $\beta_2 < 0$ and $\beta_3 = 0$ then it shows theory of decreasing inequality. U-shape relation exist If we find $\beta_2 < 0$ and $\beta_3 > 0$. If the estimated parameters are $\beta_2 > 0$ and $\beta_3 < 0$ then it confirms the presence of an inverted U-shape relationship. Similarly, the non-linear association between income inequality and government expenditure is comprehended.

3.2 Empirical Methodology

Based on Eq. 3, we intended to extract the long-run and short-run coefficients of the selected variables. In doing so, we adopted the autoregressive distributed lag approach (ARDL) proposed by Pesaran et al. (2001). In contrast to other traditional approaches (i.e., maximum likelihood and residual-based), this approach have several added advantages. (i) It calculates the efficient coefficient even in the presence of the different lag orders. (ii) The ARDL approach works with the optimum lag-length, which allows us to get the general to the specific system. (iii) With a single equation, it calculates both types of coefficients (i.e., short-run and long-run). Most importantly, it calculates the speed of adjustment, which allows us to establish the short run to long-run equilibrium. In the literature, the speed of adjustment is termed as the ECM. The comprised variables in the study are I(0) or I(1) in nature. In other words, they are stable either at the level or at the first difference. In this kind of situation, the ARDL approach is superior to others. The econometric procedure of the ARDL approach is mentioned in Eq. 4

$$\Delta \ln IE_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln IE_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln FD_{t-i} + \sum_{i=0}^n \alpha_{4i} \Delta FD_{t-i}^2 + \sum_{i=0}^n \alpha_{5i} \Delta G_{t-i} + \sum_{i=0}^n \alpha_{6i} \Delta G_{t-i}^2 + \varepsilon_t$$

In Eq. 4, the Gini coefficient signifies income inequality (IE), per capita income(Y) (constant 2010 US\$) is used to represent economic growth. Similarly, financial development (FD) and government expenditure (G) are used as determinants of income inequality in Eq. 4. Our basic purpose is to investigate whether the growth of the financial sector and government expenditure has altered the income inequality in the country. Therefore, we have considered the squared terms of both variables. In doing so, we can explore their impacts on income inequality at the various levels of financial development and government expenditures. The short-run and long-run coefficients are exhibited by α_1 to α_6 and β_1 to β_6 , respectively. By employing the AIC approach, we considered the optimum lag-length. Subsequently, we computed the error correction model, which enables us to establish the speed of adjustment.

$$\Delta \ln IE_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln IE_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln FD_{t-i} + \sum_{i=0}^n \alpha_{4i} \Delta FD_{t-i}^2 + \sum_{i=0}^n \alpha_{5i} \Delta G_{t-i} + \sum_{i=0}^n \alpha_{6i} \Delta G_{t-i}^2 + \varepsilon_t$$

5

Here, the coefficient of the error correction term is exhibited by ρ_1 . All other variables are as per the preceding equation. In order to have a stable solution, the coefficient of error correction term should have a negative and significant value.

Equations

Full equations available in supplemental section as a download.

4 Empirical Results

The analysis starts with the development of the financial development index using the PCA method. Table 1 shows the results of PCA where Eigen value of PCA1 is more than 1 (2.93222 > 1) whereas it's less than 1 in the case of other PCA2 and PCA3. Furthermore, 97.74% of the standardized variances are explained by PCA1 in the dependent variable thus first principal component can be considered as the best principal component than others. So, the analysis is based on only the first principal component. The respective factor scores of other variables are also considered to calculate the final index. The outcomes of the KMO test are found statistically desirable.

Table 1
Principal Component Analysis

Components	Eigenvalues	Proportion	Cumulative Proportion
PCA1	2.932	0.977	0.977
PCA2	0.036	0.012	0.989
PCA3	0.031	0.010	1.000
	Vector	KMO Score	Factor loads
BM	0.577	-	0.245
DCPS	0.576	-	0.356
DCF	0.577	-	0.454
Total	-	6.589	-
Source: Based on the author(s) calculations.			

<INSERT Table 1 HERE>

Before moving to ARDL analysis, it is essential to examine the unit root properties of all the variables to confirm that no one of the series is integrated at I(2). The present study has applied Dickey and Fuller (1981) and PP by Phillips and Perron (1988) ADF test to check the stationarity of the variables. The results of both the unit root tests are depicted in Table 2. Null hypothesis (H_0) in both the test that IE, Y, FD, and FD^2 are non-stationary at level cannot be rejected. Nevertheless, these variables are stationary at first difference. Hence it can be concluded that all the variables have first order of integration I(1) excepting G and G^2 that are stationary at level i.e. integrated of order I(0). ARDL bound testing to cointegration is based on the assumption that series are integrated of I(1), or I(0) or I(1)/I(0) (Shahbaz et al. 2015). Our results of unit root tests reveal that no one of the series is beyond the I(1) order of integration. After confirming that all the variables are integrated of order 1 I(1) and ARDL is the best-suited estimation method for the model specified in Eq. 3.

Table 2
Unit Root Test

Variables	ADF		Phillips-Perron (PP)	
	level	1st diff	level	1st diff
IE	0.146 (0.965)	-2.877* (0.056)	0.906 (0.994)	-2.800* (0.067)
Y	3.084 (1.000)	-6.547*** (0.000)	5.707 (1.000)	-6.562*** (0.000)
G	-3.655*** (0.008)	-6.585*** (0.000)	-3.861*** (0.004)	-6.666*** (0.000)
G^2	-3.346** (0.018)	-6.580*** (0.000)	-3.522** (0.0121)	-6.645*** (0.000)
FD	-1.540 (0.503)	-2.985** (0.0449)	-1.463 (0.542)	-5.732*** (0.000)
FD^2	-1.297 (0.621)	-3.280** (0.022)	-2.113 (0.240)	-4.332*** (0.001)
*, **, *** indicates significance at 10%, 5% and 1% level respectively.				

<INSERT Table 2 HERE>

<INSERT Table 3 HERE>

Table 3
ARDL bound test

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	5.554***	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
1%	3.41	4.68
Notes: *, **, *** indicates significance at 10%, 5% and 1% level respectively.		

The next step is to use the ARDL Bound test to examine the long-term association among the variables. It is seen from Table 3 that F-statistic is more than the upper critical values at 1%, 5%, and 10% significance level. Subsequently the H_0 of no long-run relationship is rejected and H_1 of long-run relationship is accepted. Therefore, it can be concluded that there is a long-run link exist among income inequality, GDP per capita, financial development, and government expenditure.

Once the cointegration between the variables is validated, thereafter the effect of explanatory variables on the income inequality is studied. Tables 4 and 5 report the estimated results of Eq. 3 for the long-run and short-run relationships respectively. The long-run estimate portrays that the coefficient of GDP per capita (Y) is positive and statistically significant at 1%. It indicates rise in GDP per capita aggravates income inequality (IE) in India. Based on the outcomes, it can be interpreted that a 1% surge in GDP per capita increases income inequality by 0.154%. This finding is in line with Berisha et al. (2019), Koh et al. (2020), Rubin and Segal (2015), Sehrawat and Giri (2015) and Shari (2000).

Table 4
Long Run Coefficients

Variable	Coefficient	t-Statistic	Prob.
Y	0.154***	5.707	0.000
G	-6.737***	-3.380	0.003
FD	0.227***	2.888	0.009
G ²	1.252***	3.346	0.003
FD ²	-0.080*	-1.765	0.094
C	11.789	4.629	0.000
Notes: *, **, *** indicates significance at 10%, 5% and 1% level respectively.			

Table 5
Short Run Coefficients

Variable	Coefficient	t-Statistic	Prob.
D(Y)	0.0108	0.262	0.796
D(Y(-1))	0.0734	1.667	0.112
D(Y(-2))	-0.0759*	-2.034	0.056
D(G)	-1.335**	-2.351	0.030
D(Y(-1))	2.067***	2.890	0.009
D(Y(-2))	0.057**	2.831	0.011
D(FD)	-0.012	-1.557	0.136
D(FD(-1))	-0.014*	-1.826	0.084
D(FD(-2))	0.088*	1.810	0.086
D(G ²)	0.253**	2.373	0.029
D(G ² (-1))	-0.386***	-2.911	0.009
D(FD ²)	0.033	1.000	0.330
D(FD ² (-1))	-0.022	-1.215	0.239
CointEq(-1)	-0.475***	-3.181	0.005
Notes: *, **, *** indicates significance at 10%, 5% and 1% level respectively.			

The effect of financial development (*FD*) on the disparity in distribution of income is positively significant at 1% level. It is seen from Table 4 that a 1% growth in financial development gives a 0.023% rise to income inequality. It shows that growth in the financial structure gives no reward to the poor. Credit facilities and other financial services are enjoyed by the wealthy strata of the society. These results are consistent with the findings of existing literature Jauch and Watzka (2016), Koh et al. (2020), Sehwat and Giri (2015) and Seven and Coskun (2016) but contradictory with the findings of Kapingura (2017) and Omar and Inaba (2020) who report that access to financial services and strong financial inclusion alleviate income inequality significantly. To capture the non-linearities, if any, and to explore the presence of the GJ hypothesis (1990), the squared term of financial development (FD^2) is used in the Eq. 3. The findings confirm the presence of a reversed U-shaped association between the financial development and income inequality in India i.e. GJ hypothesis (1990). The coefficient of *FD* and FD^2 are positive and negative i.e. 0.023 and -0.008 respectively and both of them are significant. It indicates that income inequality rises with the expansion of the financial system and it starts declining when financial structure growth reaches its highest level. This result aligns with the outcomes of prior studies Bittencourt et al. (2019), Destek et al. (2020), Shahbaz et al. (2015) and Younsi and Bechtini (2020).

Government expenditure (*G*) has an inverse relationship with income inequality. It means) distribution. A 1% rise in government expenditure decline inequality in income distribution by 6.73%. our findings are in line with the extant literature Destek et al. (2020) and Kapingura (2017). Also, empirical results confirm the presence of a U-shaped association between government expenditure and income inequality. In Eq. 3, we have contained a non-linear term of government expenditure i.e. (G^2). The coefficients of linear and non-linear terms are negative and positive i.e. -6.737 and 1.25 respectively. It suggests that initially when the government spends for the upliftment of the poor including education, health, rationing, etc. leads to improvement in the income level of the poor. But when the government doubles its spending it causes an increase in income inequality. It may be attributable to the overspending of government on infrastructure projects or on direct subsidies which doesn't bring benefits to the poor.

The long-run cointegration relationship between the variables is further supported by the significant negative coefficient of Coint Eq. (-1) that is reported in Table 5. Its value -0.475 is significant at 1% indicates that in the present year, approximately 48% disequilibrium in income equality is adjusted back to long-run equilibrium.

The robustness of the results is checked through the diagnostic and stability tests. The results of the diagnostic and stability tests for Eq. 3 are presented in Table 6. Results show that the null hypothesis (H_0) of no autocorrelation and no heteroscedasticity can't be rejected. Jarque-Bera statistic supports the normal distribution of the residual term. Also, the model is correctly specified. Furthermore, we have used CUSUM (Fig. 2) and CUSUMSQ (Fig. 3) tests to inspect the stability of long-run parameters along with short-run estimates. Both CUSUM and CUSUMSQ plots lie between the critical bound at a 5% significance level. It approves the steadiness of ARDL estimates. Therefore, it is confirmed that estimated coefficients are strong and stable during the study period, and the model is appropriately specified.

Table 6
Diagnostic statistics

Breusch-Godfrey Serial Correlation LM Test		H₀: there is no autocorrelation	
F-statistic	1.632	Prob. F (2,16)	0.226
Obs*R-squared	6.777	Prob. Chi-Square (2)	0.233
Heteroskedasticity Test: Breusch-Pagan- Godfrey		H₀: there is no heteroskedasticity	
F-statistic	0.770	Prob. F(21,18)	0.719
Obs*R-squared	18.933	Prob. Chi-Square(21)	0.589
Normality test		H₀: the residuals are normally distributed	
Jarque-Bera	0.329	Probability	0.847
Ramsey RESET Test of model specification		H₀: the model is correctly specified	
t-statistic	0.419	-	
F-statistic	0.175	-	
Source of data: Standardized World Income Inequality Database (SWIID 6.1)			

<INSERT Table 4 HERE>

<INSERT Table 5 HERE>

<INSERT Table 6 HERE>

<INSERT FIGURE 2 AND FIGURE 3 HERE>

5 Conclusion And Policy Implications

Existing literature on the inverted U-shaped association of financial development with inequality in income distribution portrays diverse and inconclusive findings. As the state and nature of the development of the financial system may be different in different economies so it requires further empirical work to validate this relationship. As far as India is concerned, we find very few studies in this direction since the government of India initiated several measures to reduce inequality in income distribution, especially during the current decade. Hence the present study is an attempt to contribute in this direction by investigating the linkage between financial development and income inequality in India, also examining the presence of GJ (1990) hypothesis over the period 1973 to 2015. Besides, the study also used two other variables i.e. GDP per capita and government expenditure.

Using ADF and PP unit root tests, it is confirmed that all the variables under consideration are stationary at first difference. ARDL bound test shows the incidence of a long-term link between the variables. Empirical findings reveal the existence of the GJ hypothesis, this means an reversed U-shaped association of financial development with income inequality is present in India. It proves that in India when the development of the financial system is at its premature stage then it impeded the inequality in income distribution. But once it enters into the maturity stage when credit facilities are accessible by the poor then it starts reducing inequality. Besides this, results show that an increase in GDP per capita worsens income inequality, and the poor segment is not benefited by the growth of the economy. It is also confirmed from the empirical results that there is a U-shaped linkage between government expenditure and income inequality. It reflects that initially the government spends to empower the poor but gradually funds shift to the growth-oriented projects.

Without government intervention, income inequality can't be reduced. Income has to be redistributed from rich to poor segment through different measures of economic policies (fiscal and monetary policy). The government has to generate further employment prospects for the poor and should spend more on their education and health to transform them into skilled entrepreneurs. Human capital formation is necessary through quality and vocational education for inclusive development of the society. The results of this study show that initially, the government expenditure reduces income inequality; but, its long-run role in reducing income inequality is observed negative. It necessitates the government spend more on welfare programmes for the poor in the long run providing financial activities carried by the banking sector should complement the government expenditures. Once the government welfare scheme is initiated, it should be consistently supported by the banking sector. The positive impact of a developed financial system on income inequality may become ineffective if government spending, in the long run, remain inclined towards loans to the big corporates.

Referring to the outcomes of the study, it is evident that in India, the increased per capita income invigorates the income inequality. To navigate the harmful impact of increased income per capita, the government has to promote industrialization in rural and remote areas to make the optimal utilization of idle resources and to make the growth more balanced and sustainable. Also, the policymakers should give attention to the policies which facilitate and motivate the skilled workforce for their start-ups. Although some such schemes are already in place but due to lack of awareness, people are not able to obtain the advantage of these schemes. Hence awareness programmes may be initiated by the government in association with various branches of the banks located in rural areas. In India, a more efficient and strong financial system needs to be established which provides a better and wide range of financial services accessible by the deprived people of India. Furthermore, microcredit should be encouraged through micro-financial institutions. The collateral requirement may be relaxed while sanctioning credit to the poor. Consequently, they can easily start their livelihood activities and raise their income level which further, shrinks the income gap between poor and affluent. Entrepreneurial activities will help them to participate in the capital market and thereby it augments capital

formation in the country also. So, policymakers should pay their attention to the efficient functioning of the financial system as well as the proper execution of the financial policies. Also, adequate reform in the financial sector must be initiated to bring the poor into the mainstream.

Declarations

We declare that the manuscript is not submitted anywhere else for consideration and there is no conflict of interest between authors and any other third party.

Consent for publication

Yes

Availability of data and materials

We will provide the related data as and when required.

Competing interests

There is no financial and non-financial interests involved.

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Authors' contributions

Corresponding author (Dr. Rajesh Sharma) collected the data and computed the results.

First author (Dr. Suman Dahiya) has written the manuscript and gave it final shape.

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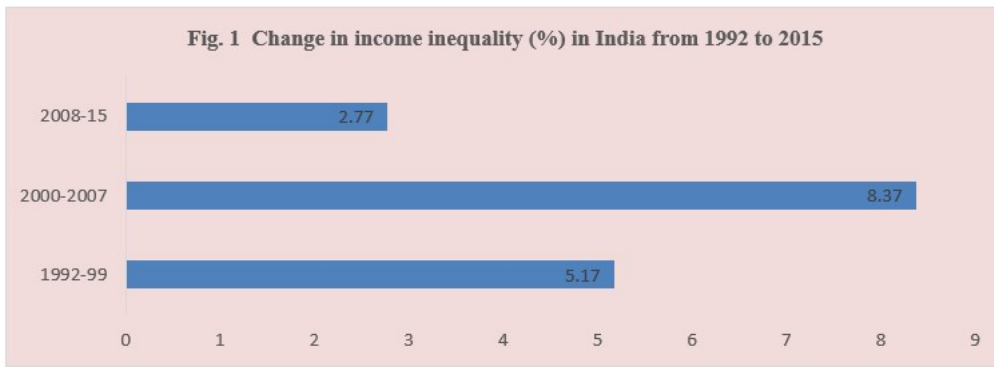
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Figures



Source of data: Standardized World Income Inequality Database (SWIID 6.1)

Figure 1

Change in income inequality (%) in India

Figure 2: CUSUM test

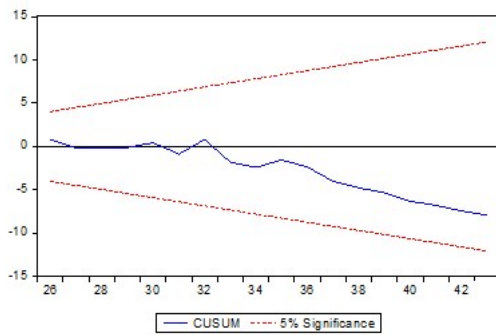


Figure 2

CUSUM test

Figure 3: CUSUM of square test

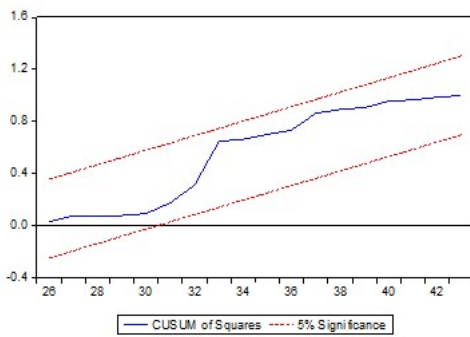


Figure 3

CUSUM of square test

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